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VELOCITY PROFILES FROM PROJECT EARS, CRUISE 1 (28 OCT - 13 DEC --ETC(U)
MAY 67 R B MACDONALD

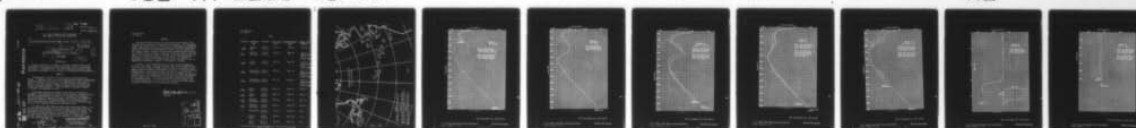
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U. S. NAVY UNDERWATER SOUND LABORATORY
FORT TRUMBULL, NEW LONDON, CONNECTICUT

6 VELOCITY PROFILES FROM PROJECT EARS, CRUISE 1 (28 Oct - 13 Dec 1966),

by

14 USL Problem No.
7-1-401-00-00

10 Robert B. MacDonald

9 USL Technical Memorandum No. 2211-58-67

11 15 May 1967

INTRODUCTION

This is the first in a series of technical memoranda dealing with environmental data obtained during Project EARS, Cruise 1 in the period 28 October - 13 December 1966. The velocity profiles included in this memorandum are presented for the purposes of documentation and reference.

RESULTS

The geographic locations of the velocimeter casts are shown in Figure 1. Stations 6 and 7 are shallow water areas and their corresponding velocity profiles are plotted to a more expanded scale than those of Stations 1 through 5 in that figure. Profile location coordinates are shown on each plot (Figures 2 through 8) together with the date, time of day, and area description. Other information relating to Figures 2 through 8 is summarized in Table 1.

In providing velocity structures for ray path and theoretical propagation loss computations on USL's IBM 704 computer, a given velocity profile is approximated by a maximum of 40 contiguous line segments. The profiles shown in Figures 2 through 8 are plotted in this segmented version as provided to the computer rather than as smoothed curves. The profiles have been punched on IBM cards in a format permitting their use on all USL programs accepting velocity-depth input.

Two AGOR ships, USNS SANDS and LYNCH, were used during Cruise 1. All profiles with the exception of that from Station 4 were taken with TR-4 velocimeters with data printout on USL's oceanographic data system. The NOO Ramsey probe was employed on the Lynch for the Station 4 profile. The ocean bottom depths obtained from the Westrex Precision Depth Recorder traces at the location of the profiles, are indicated on each plot and listed in Table 1.

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COMMENTS

The most striking variation from the typical mid-latitude, North Atlantic profile occurs in the Sands Station 3 profile. The difference observed is a direct result of the outflow of Mediterranean intermediate water. This warmer more saline outflow infuses the normal temperature-salinity structure of the intermediate Atlantic waters to produce the dual channel effect. Remnants of this double layered velocity structure can be seen in the two Station 5 profiles. These were taken on the west side of the mid-Atlantic ridge on the edge of the Newfoundland Basin at a distance of 1600 statute miles from the Straits. The gradually diminishing influence of the Mediterranean influx from east to west is graphically illustrated in Figure 1 for Stations 3 through 5.

Station 6 on the Grand Banks proved to have the most unexpected profile of the cruise. Although the Banks area for many years has been one of the most intensely fished regions in the world, detailed oceanographic data for acoustic investigations is scarce. The unusual velocity discontinuity in this profile at about 160 feet is a result of the southerly flow of the denser cold Labrador current beneath the overlying Atlantic water. The interesting point here is not so much the presence of the colder water on the bank, but the sharp stratification of the two temperature layers. A velocity change of 64 ft/sec occurs in the 20 foot increment from 144 to 164 feet. A BT taken at the same time is included in confirmation of the velocimeter readings.

Robert B Mac Donald
ROBERT B. MAC DONALD
Physicist

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TABLE 1

STATION #	GEOGRAPHIC AREA	POSITION	WATER DEPTH (PDR)	MAXIMUM PROFILE DEPTH	CHANNEL AXIS DEPTH(s)
1 SANDS	Galicia Bank	42°42'N 11°42'W	2100 ft.	2020 ft.	770 ft.
1 LYNCH	Galicia Bank Area	41°04'N 11°55'W	14600 ft.	13885 ft.	735 ft. (Upper Axis) 5281 ft. (Lower Axis)
2 SANDS	Iberian Basin	41°27'N 14°34'W	17500 ft.	14420 ft.	1107 ft. (Upper Axis) 5695 ft. (Lower Axis)
3 SANDS	Approaches to Gibraltar	34°47'N 10°10'W	13200 ft.	13041 ft.	1813 ft. (Upper Axis) 6760 ft. (Lower Axis)
3 LYNCH	Approaches to Gibraltar	34°25'N 12°17'W	14120 ft.	14063 ft.	1953 ft. (Upper Axis) 6129 ft. (Lower Axis)
4 SANDS	Azores Rise	36°33'N 21°04'W	15660 ft.	15342 ft.	5700 ft.
4 LYNCH	Azores Rise	36°58'N 22°36'W	14280 ft.	12950 ft.	5450 ft.
5 SANDS	Newfound-land Basin	40°20'N 32°58'W	10380 ft.	9001 ft.	4015 ft.
5 LYNCH	Newfound-land Basin	41°34'N 35°32'W	14920 ft.	14452 ft.*	4050 ft.
6	Grand Banks	45°03'N 51°30'W	220 ft.	191.8 ft.	none
7	Gulf of Maine	43°30'N 67°00'W	660 ft.	599.3 ft.	none
7	Gulf of Maine	43°10'N 67°40'W	582 ft.	540. ft	none

* Velocimeter depth gauge indicated the bottom had been reached.

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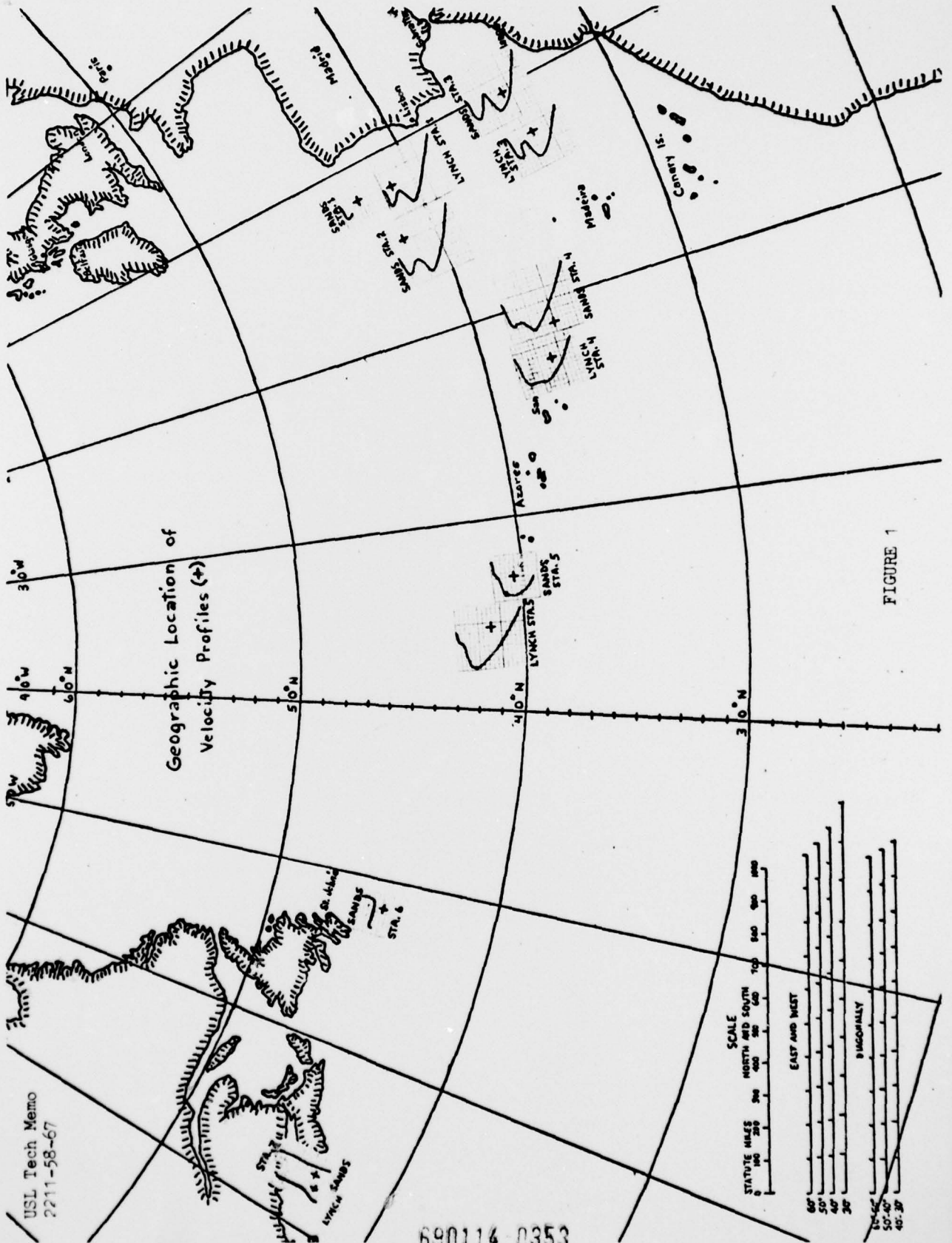


FIGURE 1

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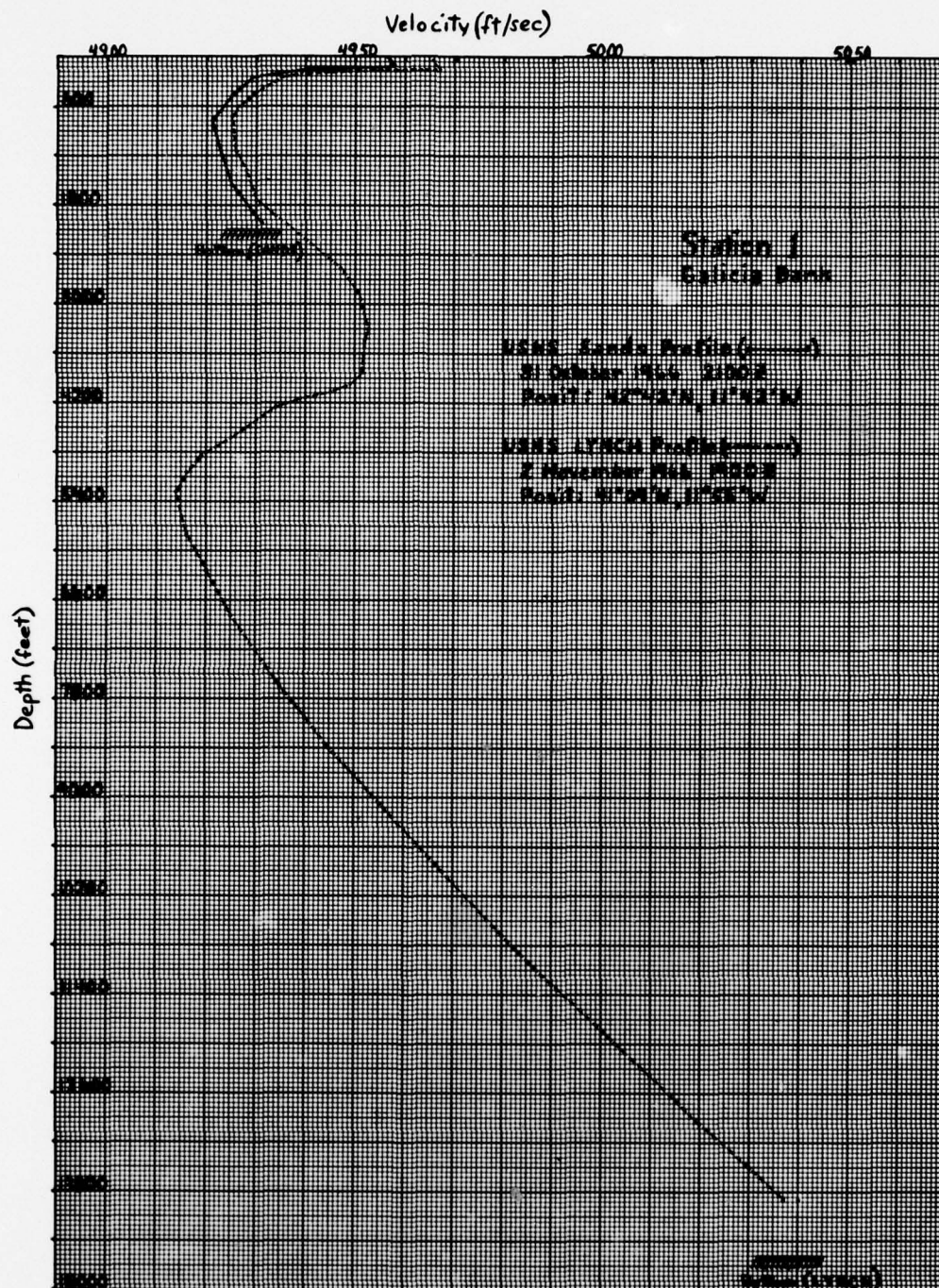


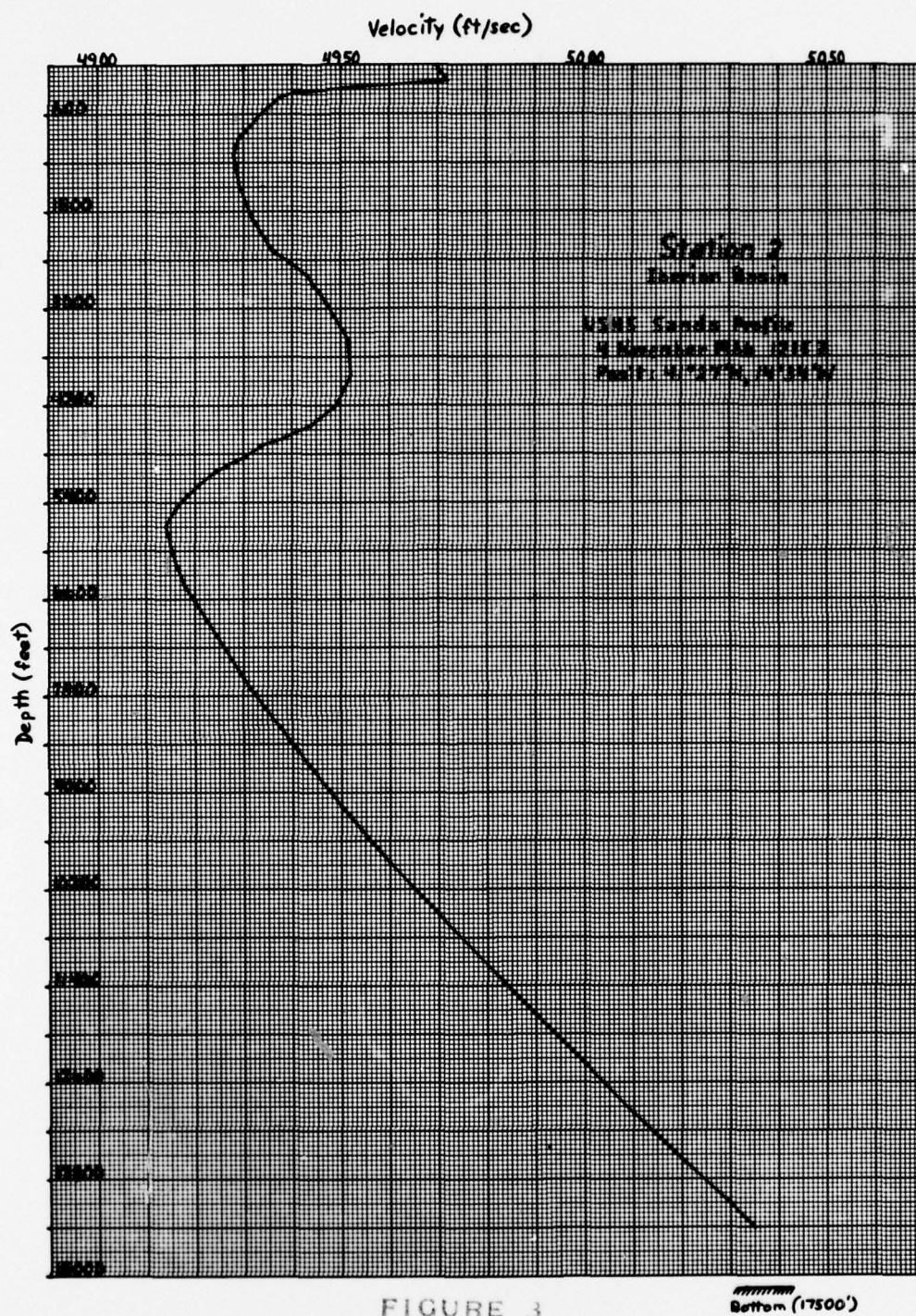
FIGURE 2

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NP24 - 30347 - 4 - 67

Official Photograph

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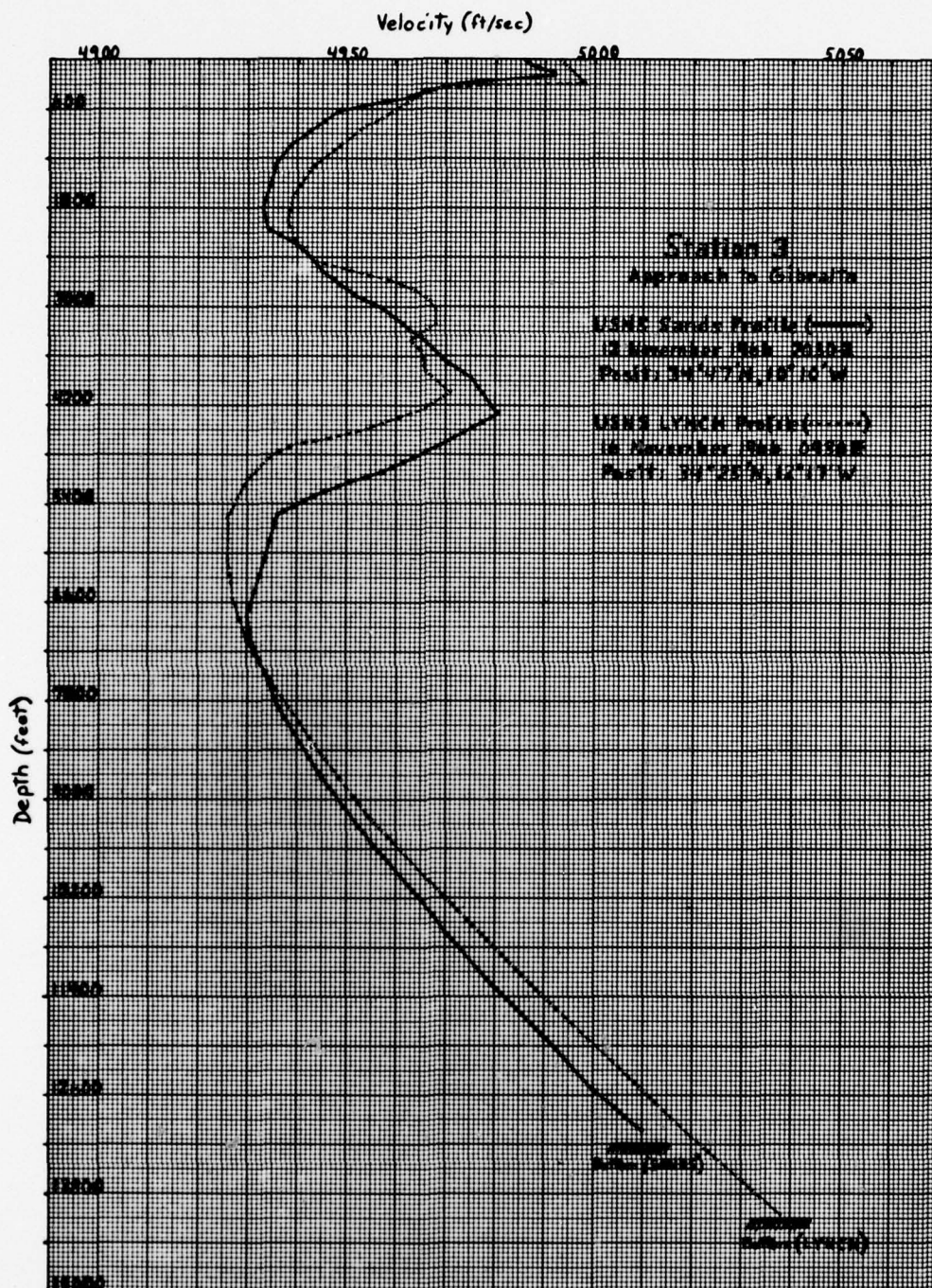


FIGURE 4

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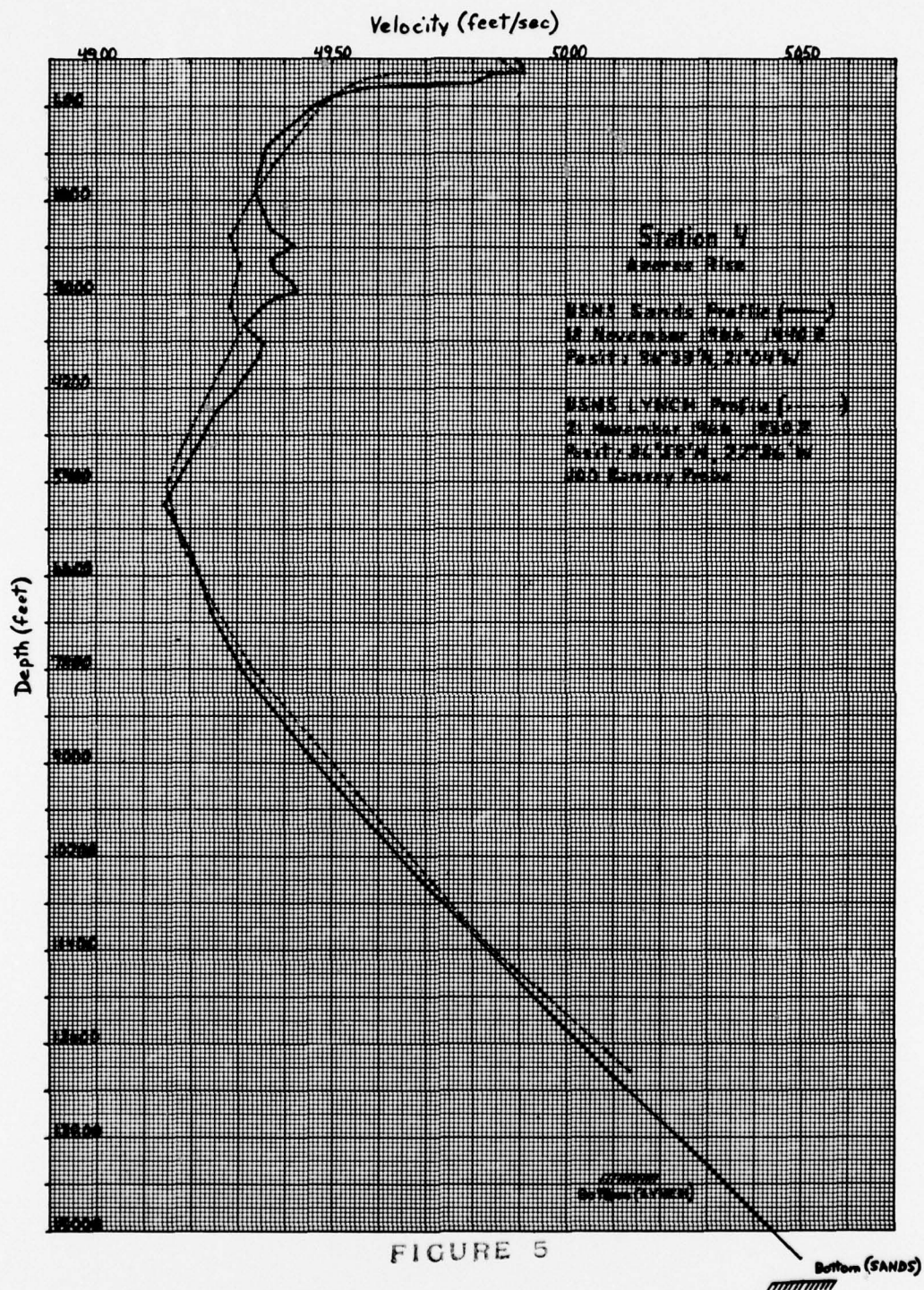


FIGURE 5

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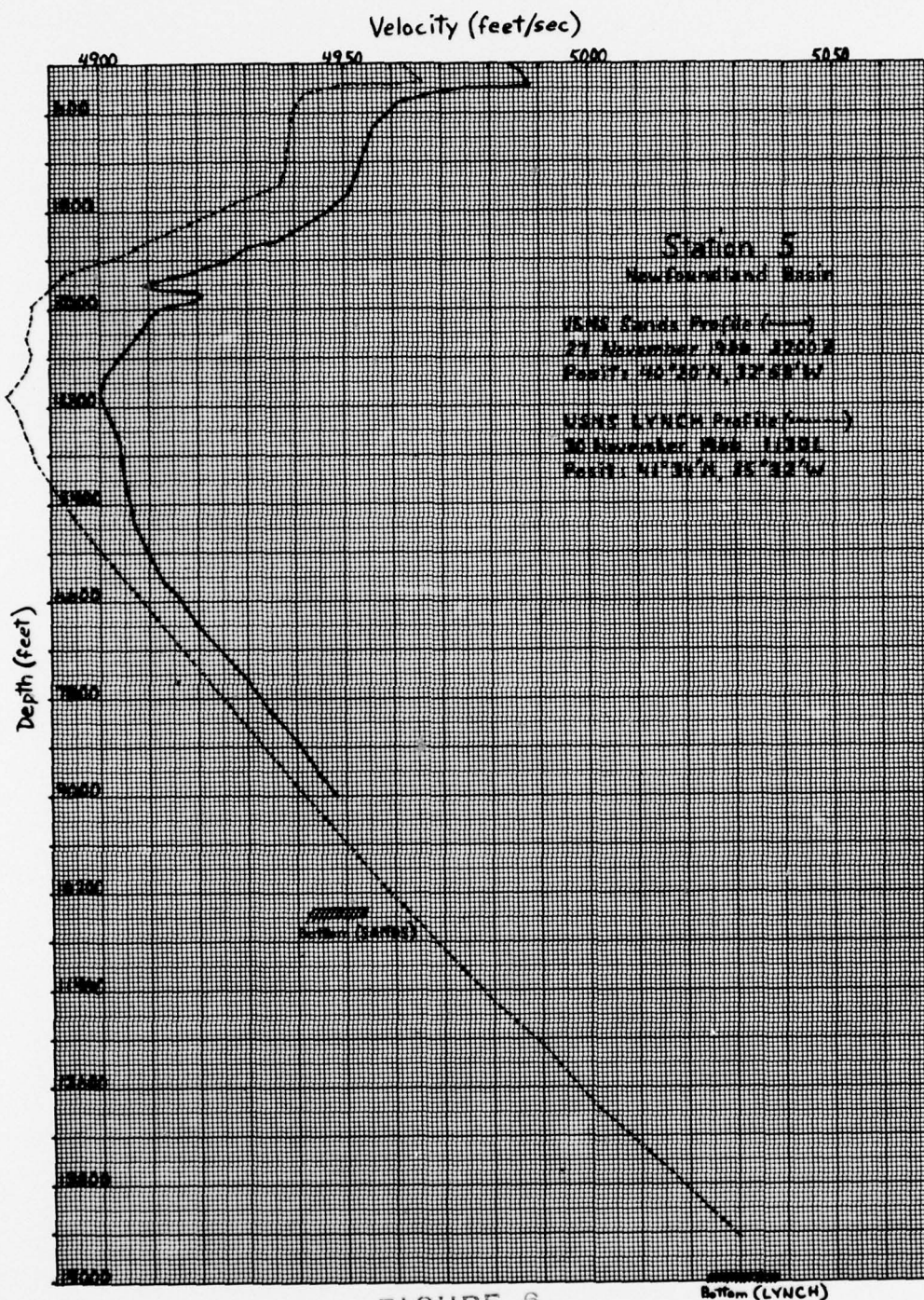


FIGURE 6

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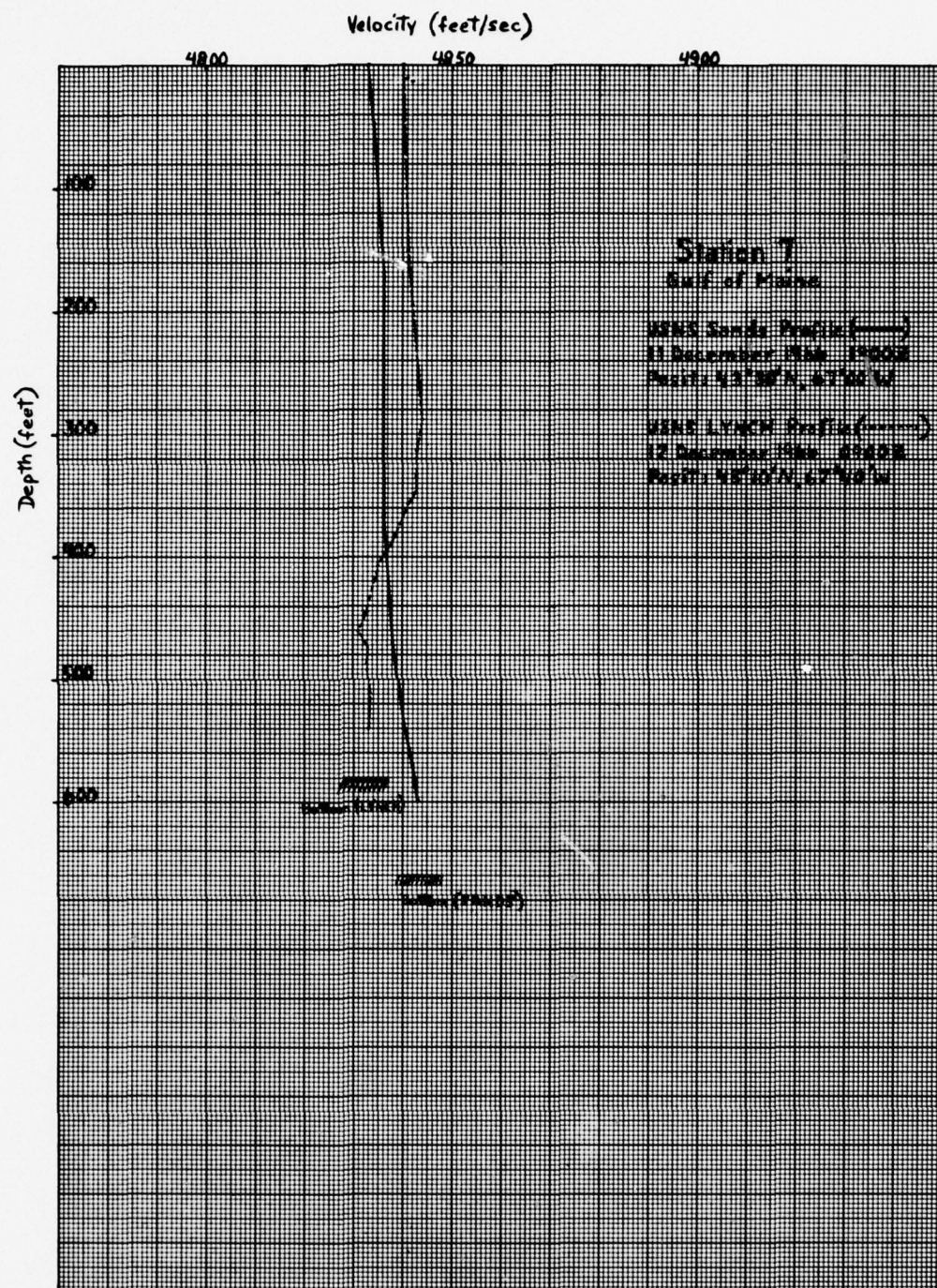


FIGURE 8

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